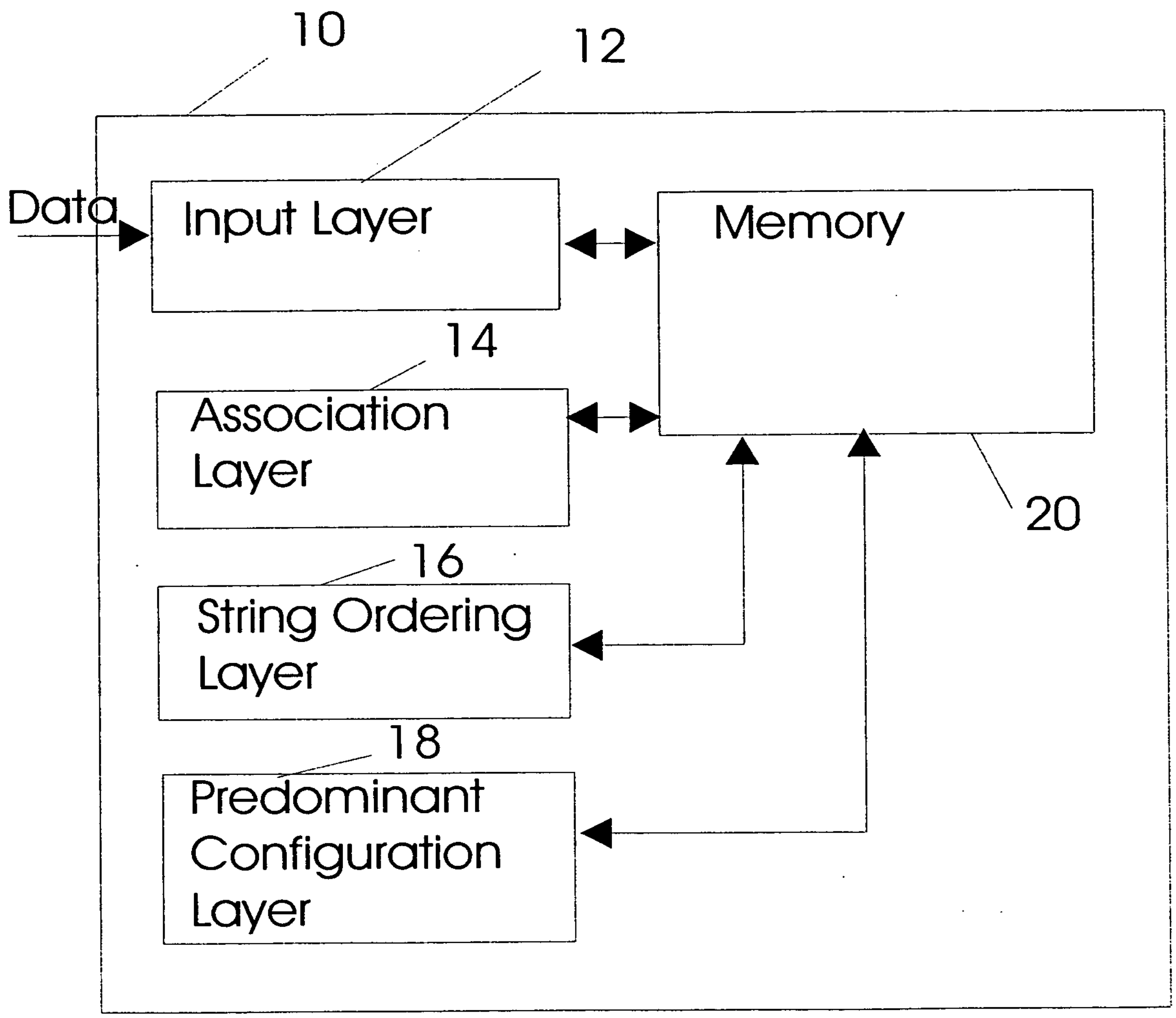

10
12
Data
Input Layer
Memory
14
Association Layer
20
16
String Ordering Layer
18
Predominant Configuration Layer

Figure 1

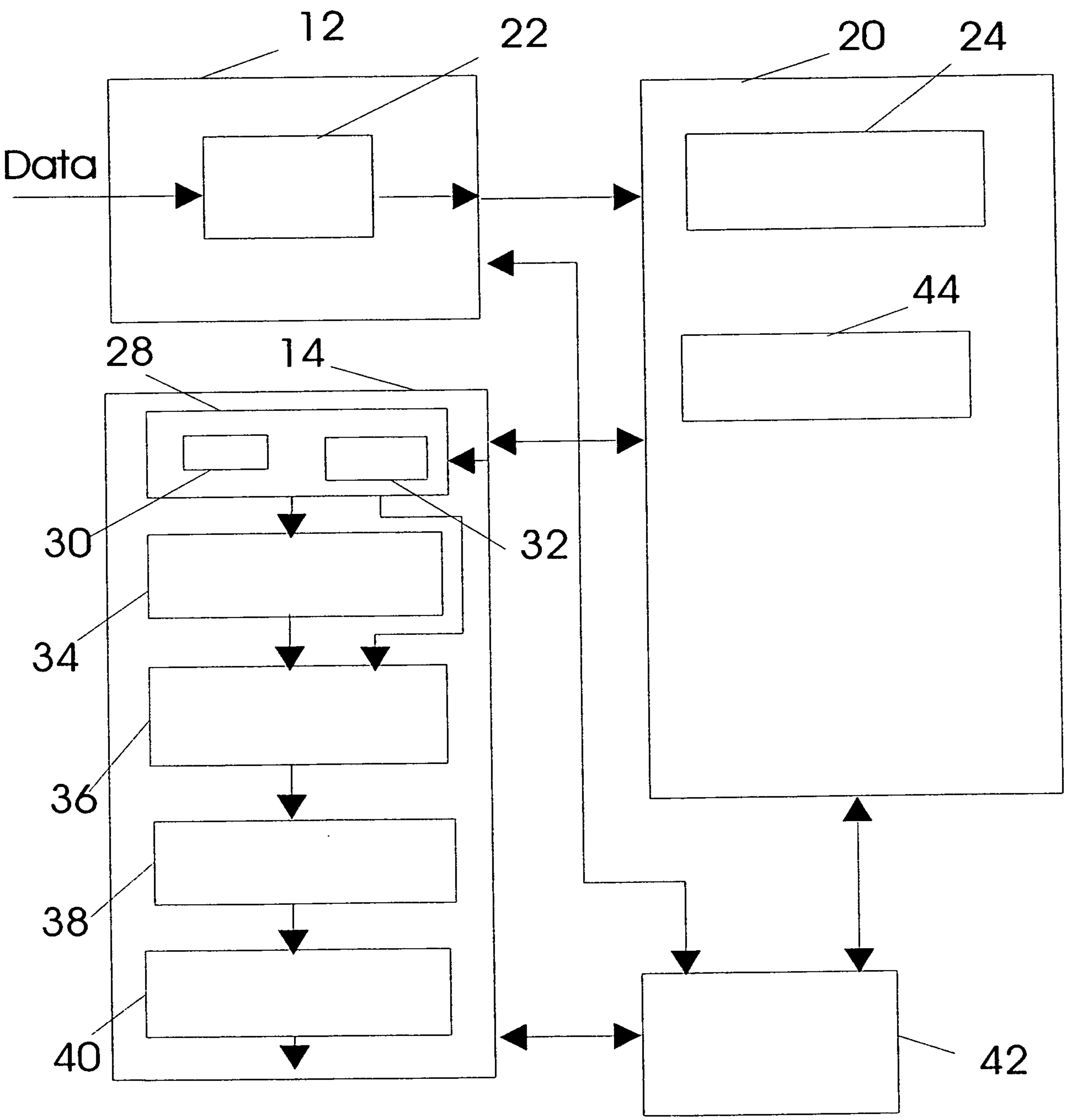
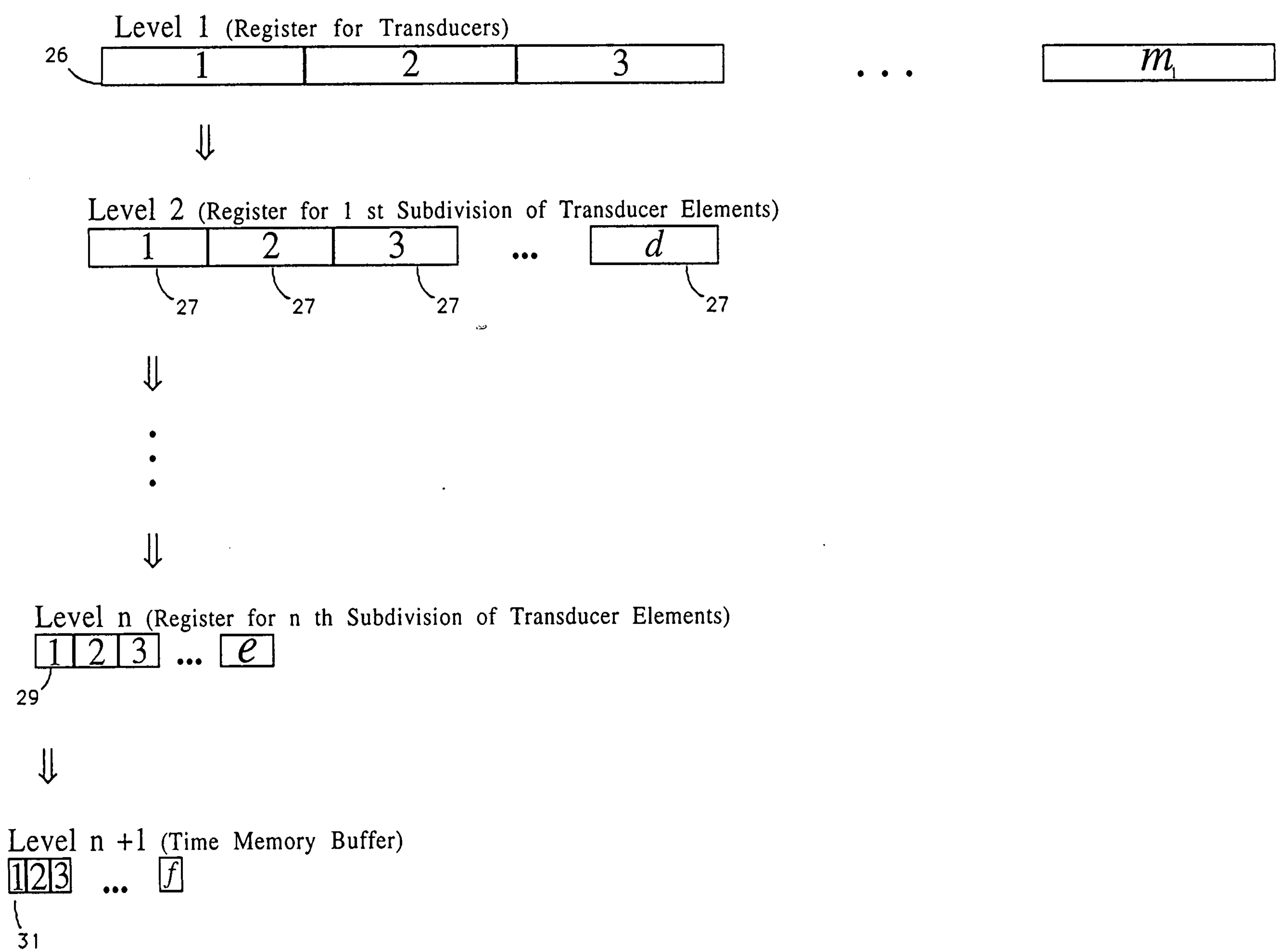


Figure 2

Fig. 3


Level 1 (Register for Transducers)
26
1
2
3
m_1
Level 2 (Register for 1 st Subdivision of Transducer Elements)
1
2
3
d
27
Level n (Register for n th Subdivision of Transducer Elements)
1
2
3
e
29
Level n +1 (Time Memory Buffer)
1
2
3
f
31

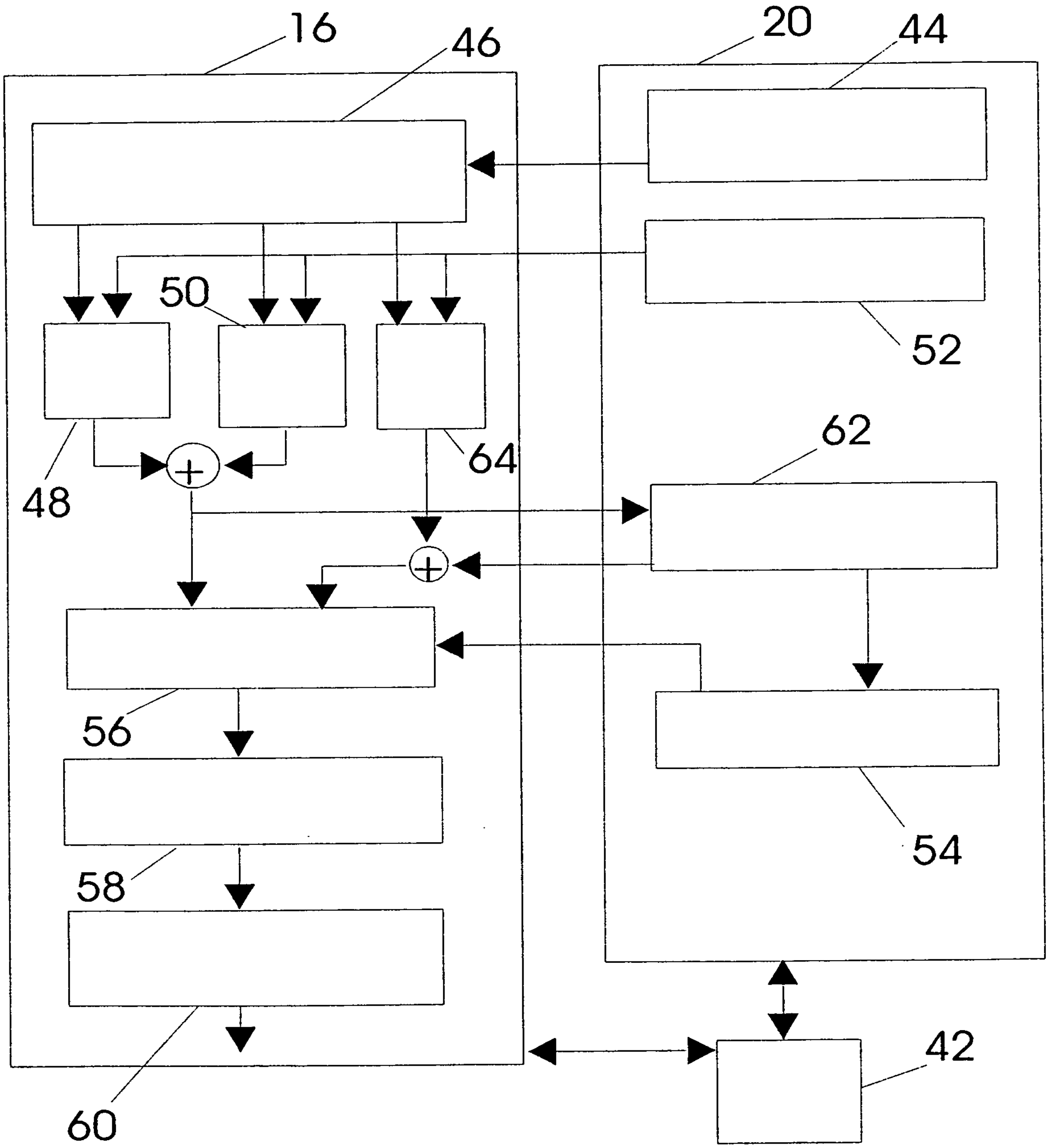


Figure 4

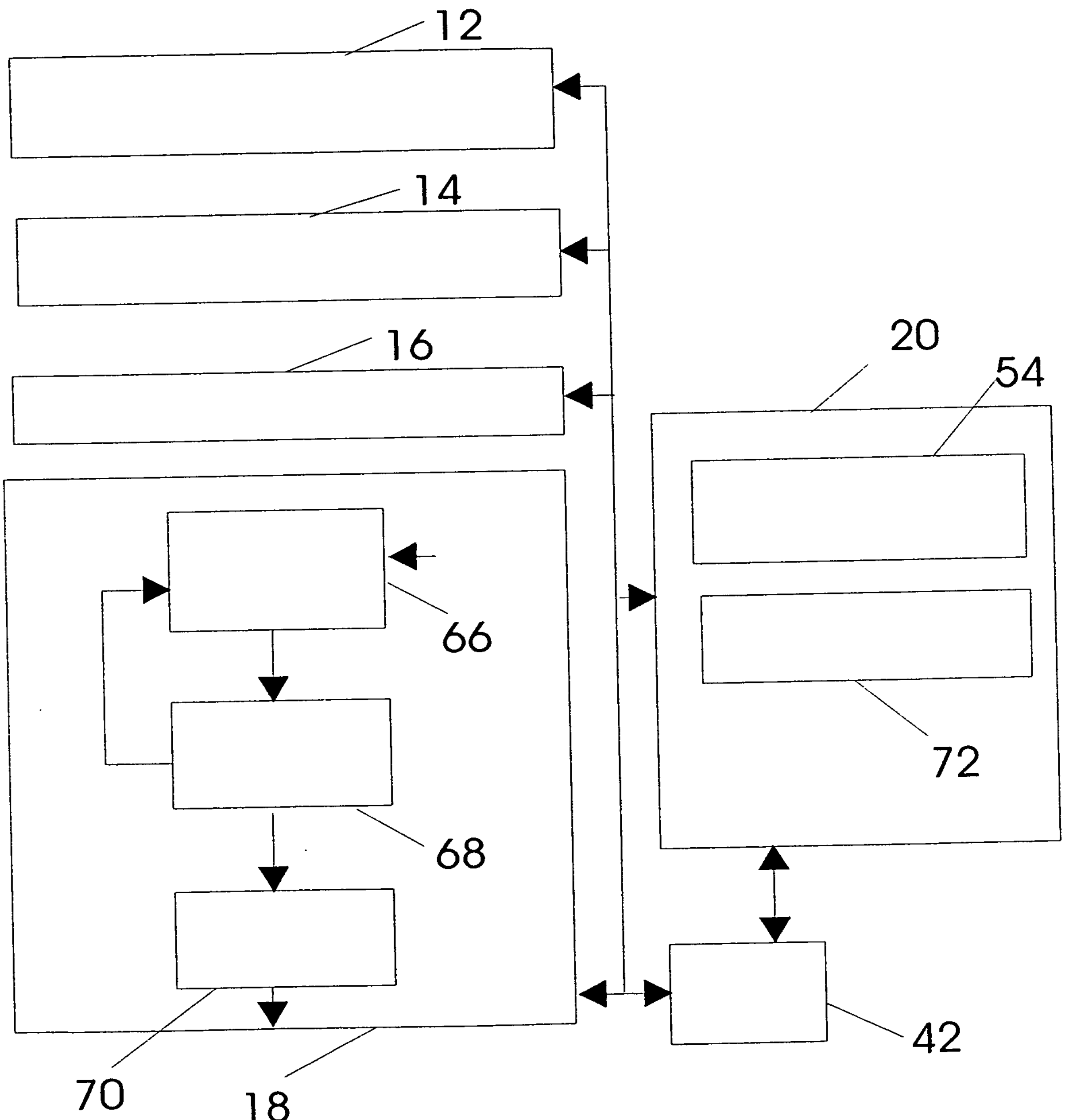


Figure 5

Fig. 6

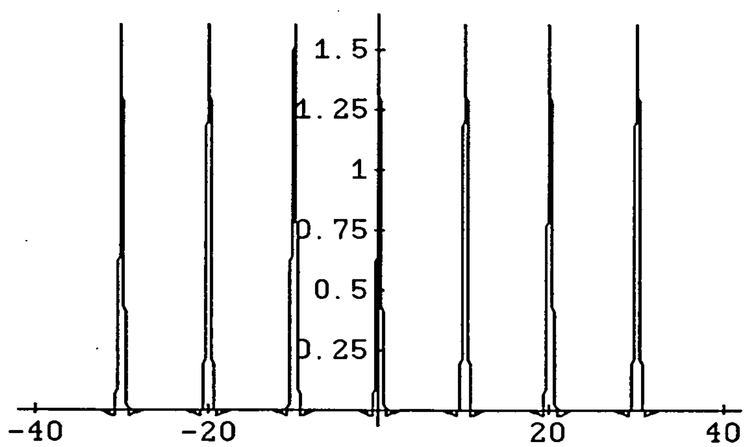


Fig. 7

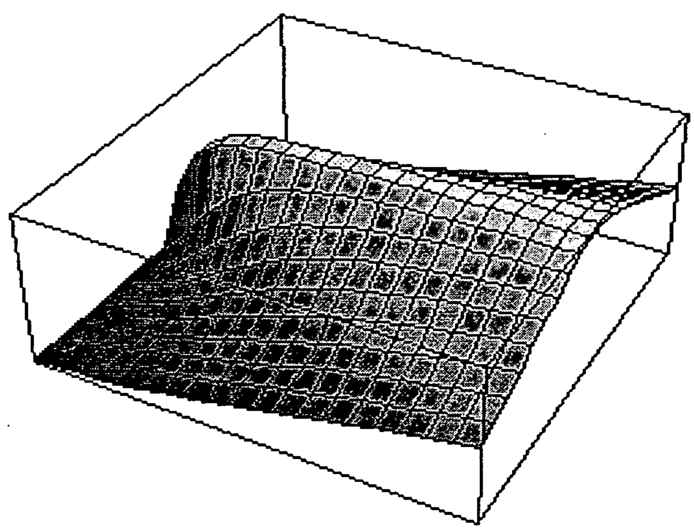


Fig. 8

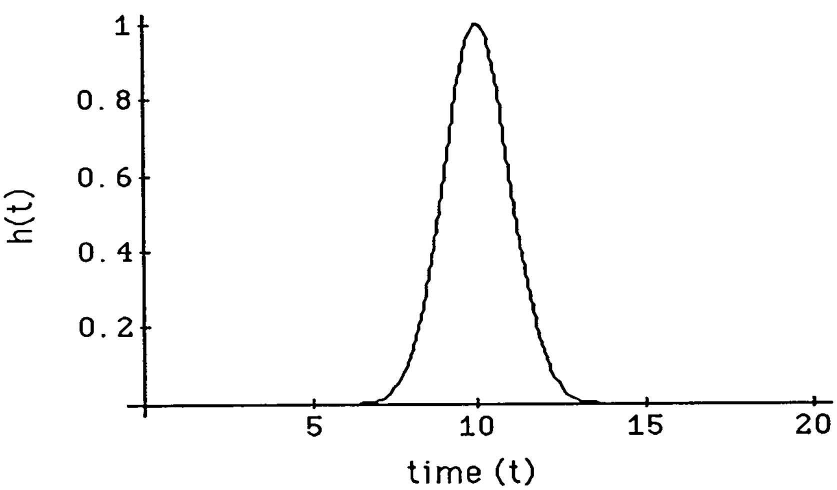


Fig. 9

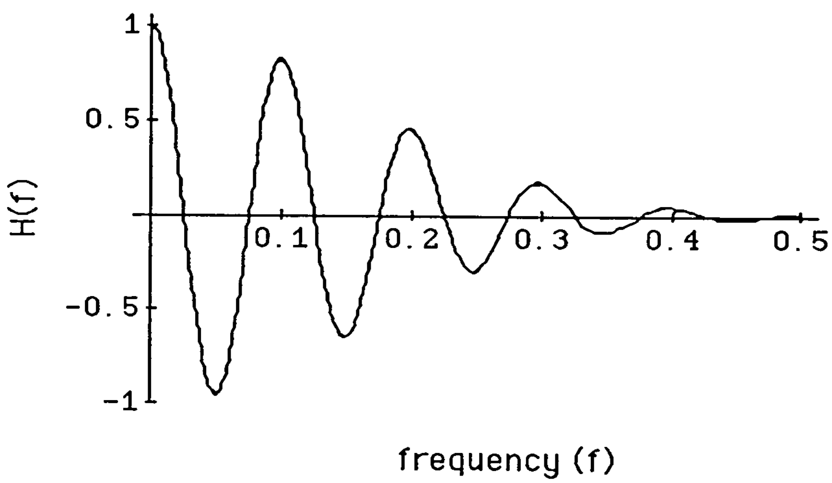


Fig. 10

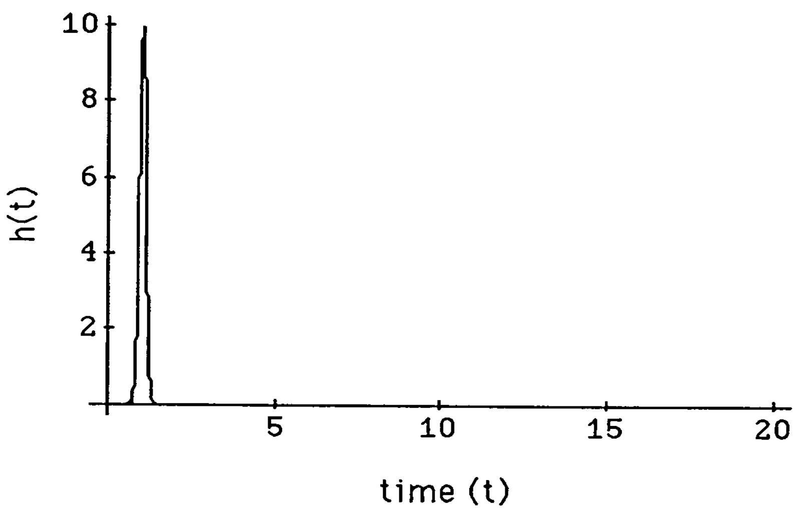


Fig 11

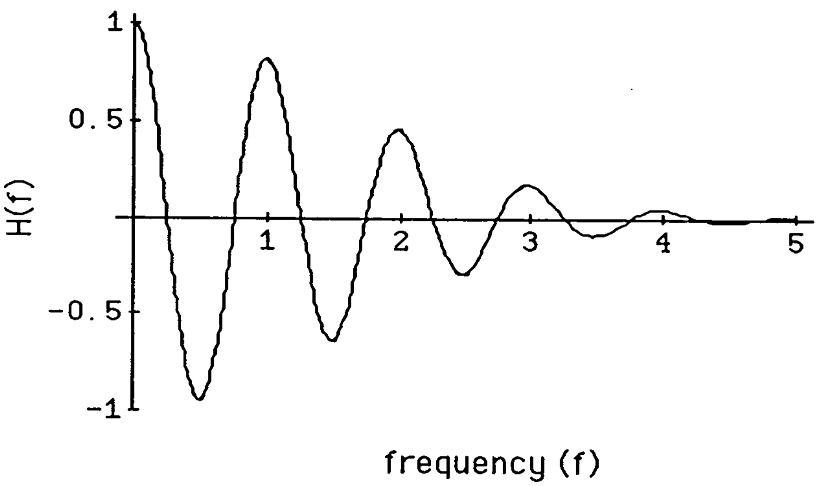


Fig. 12

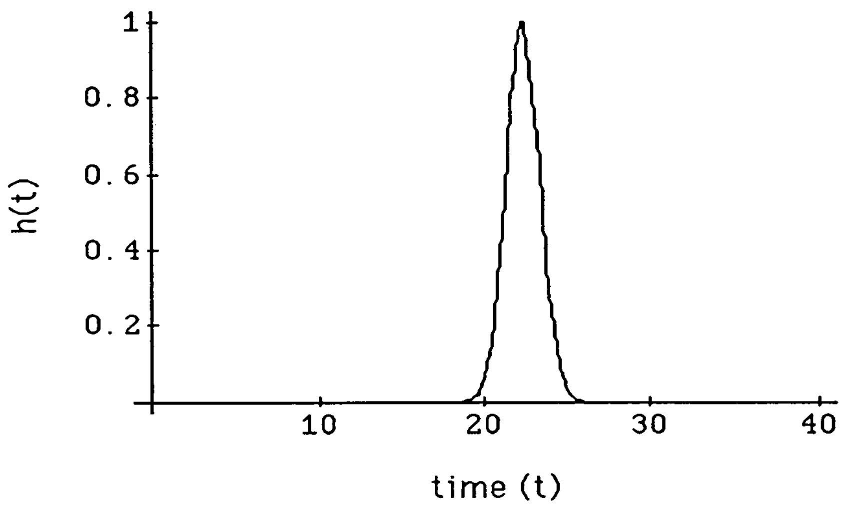


Fig. 13

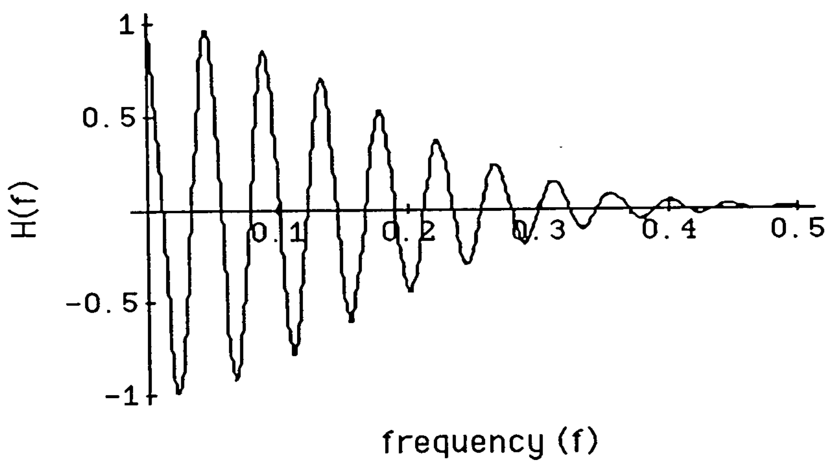


Fig. 14

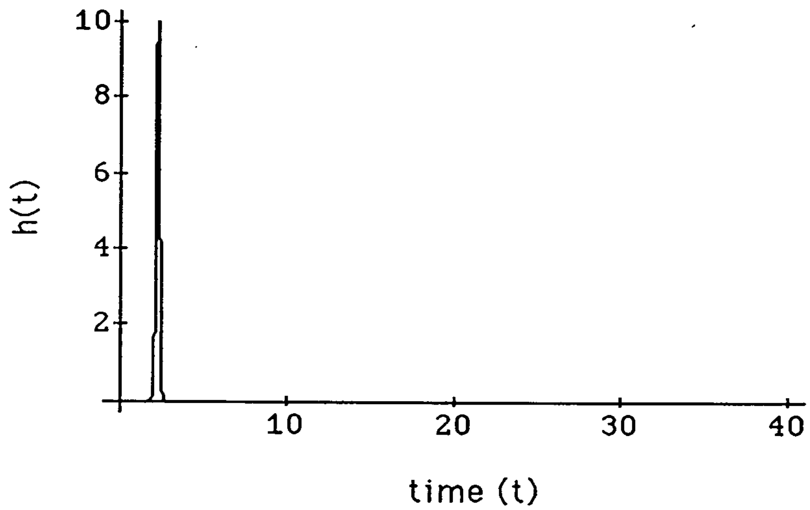


Fig. 15

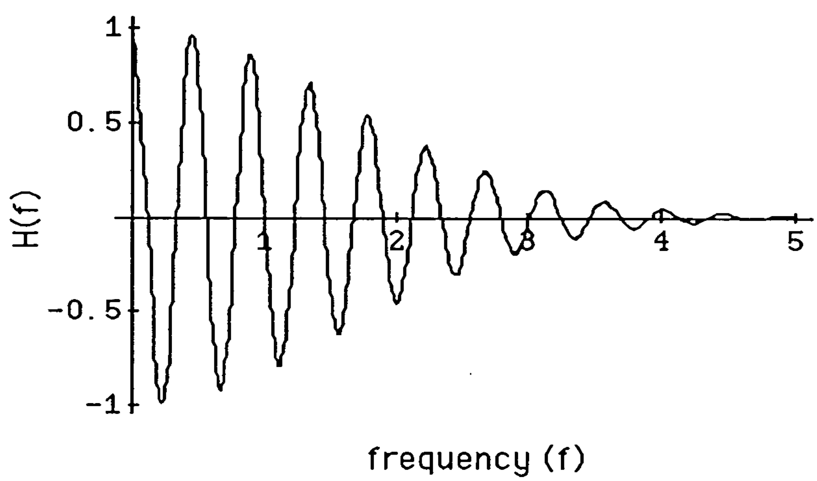


Fig. 16 A

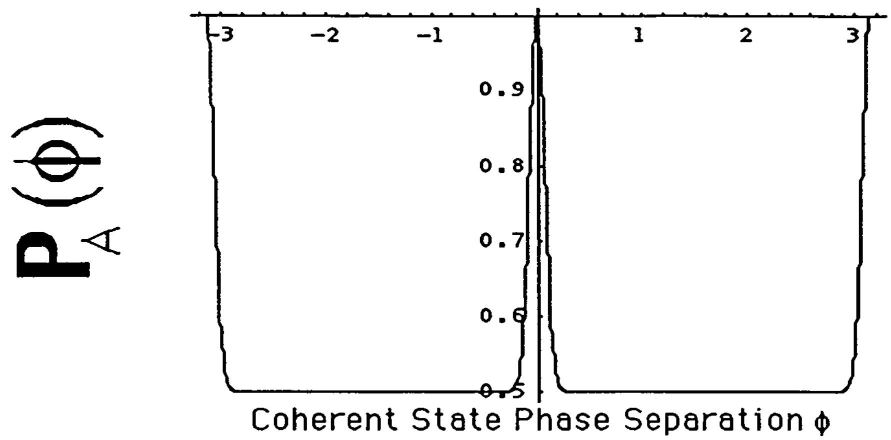


Fig. 16 B

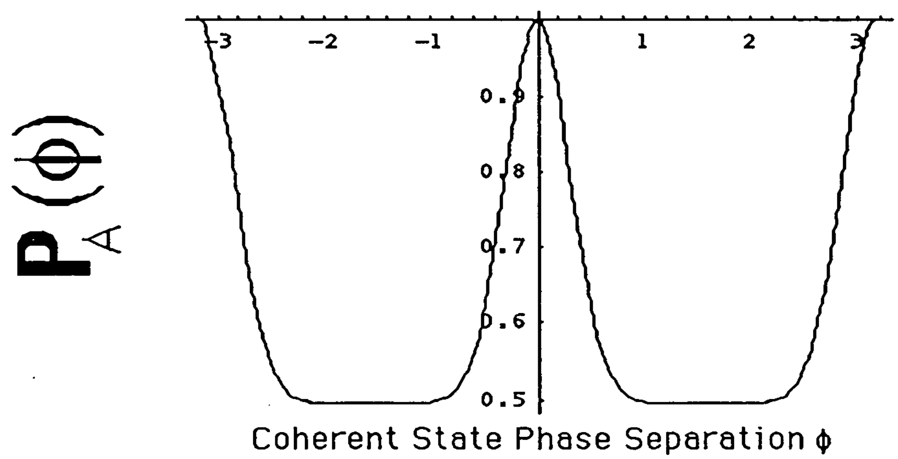


Fig. 16 C

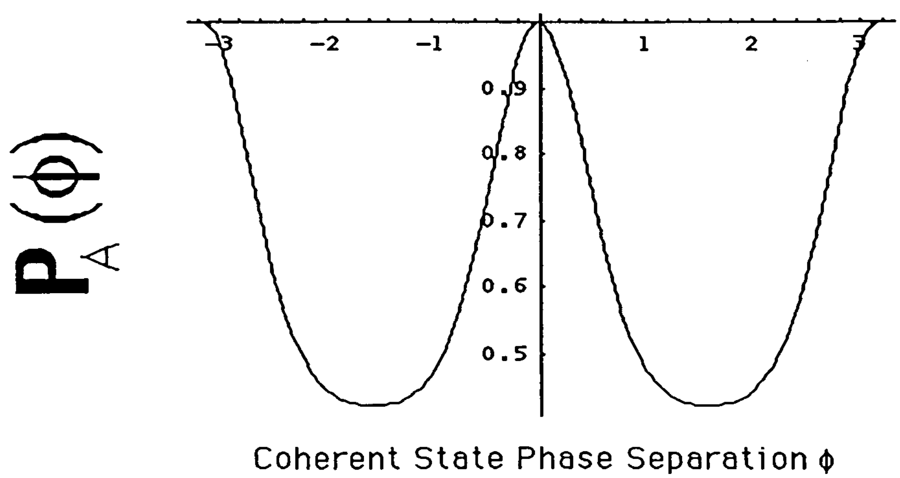


Fig. 17A

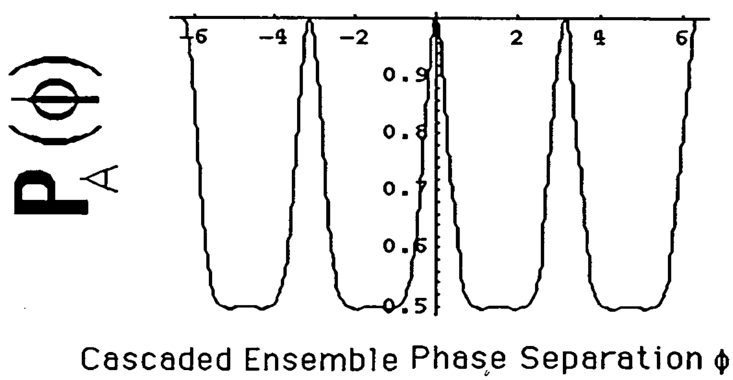


Fig. 17B

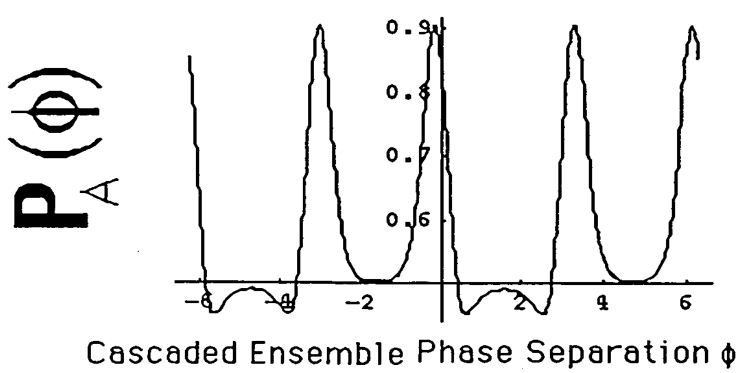


Fig. 17 **C**

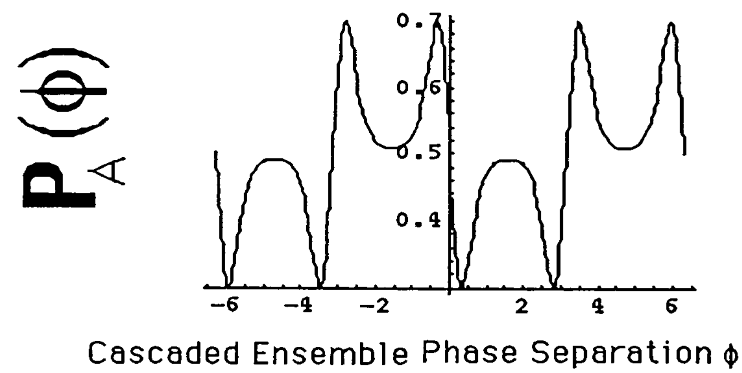


Fig. 17 **D**

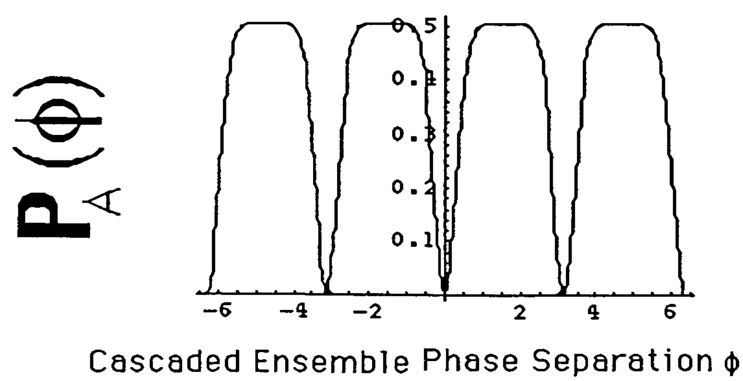


Fig. 18

Characteristic		Analog Circuit Element or Digital Equivalent
Signals Representative of Physical Characteristics	$\leftrightarrow$	Transducers
FCs	$\leftrightarrow$	P Element, M Element
SFCs	$\leftrightarrow$	P Elements, M Elements
Transducer Strings	$\leftrightarrow$	Transducer Association Processor Stages
Strings	$\leftrightarrow$	Association Ensembles, P Elements, M Elements Poisson Operator
P Strings	$\leftrightarrow$	Association Ensembles, Higher Level Memory Strings, P Elements, M Elements Poisson Operator
Predominant Configuration	$\leftrightarrow$	Activation Probability Operators

Fig. 19

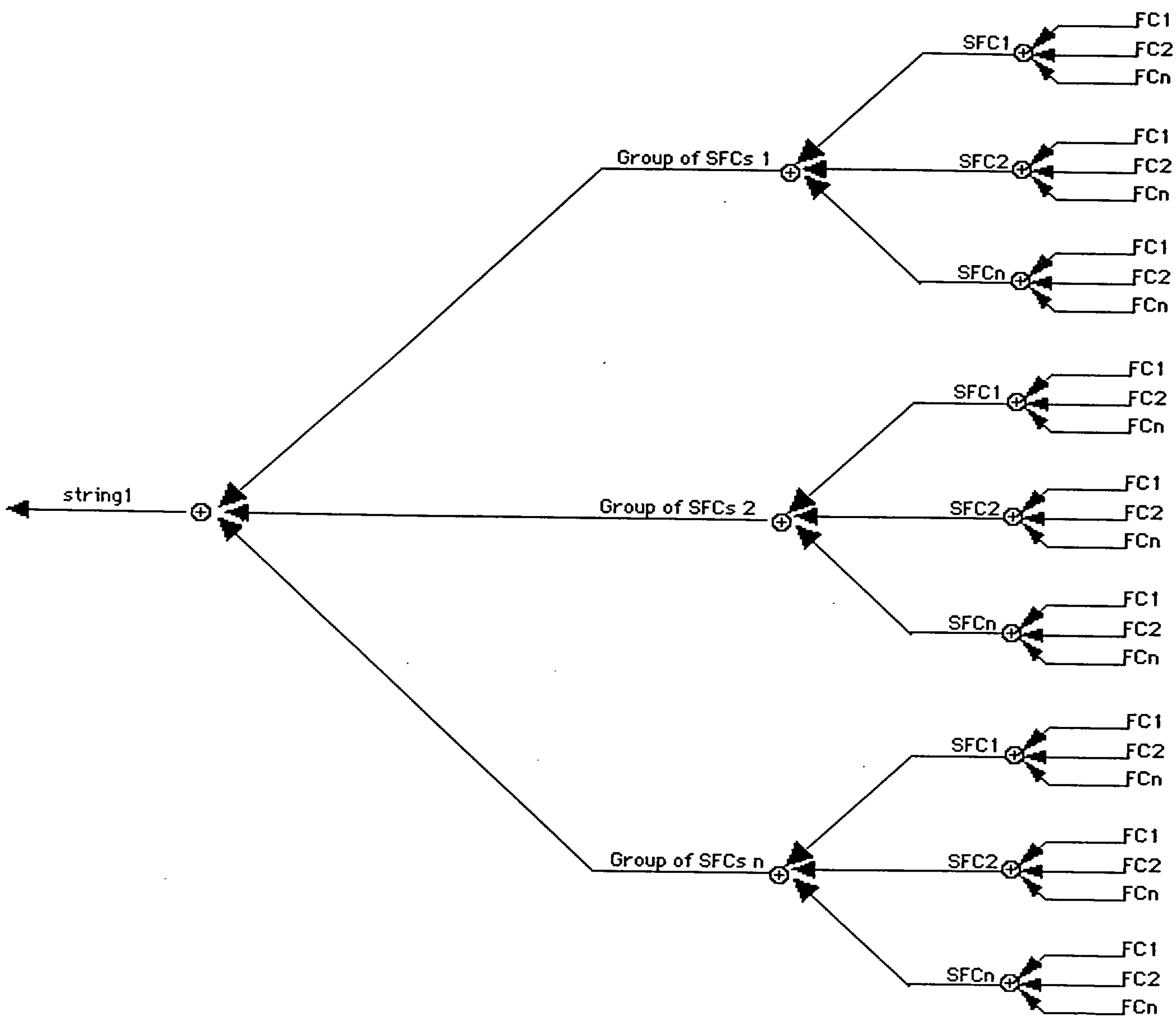
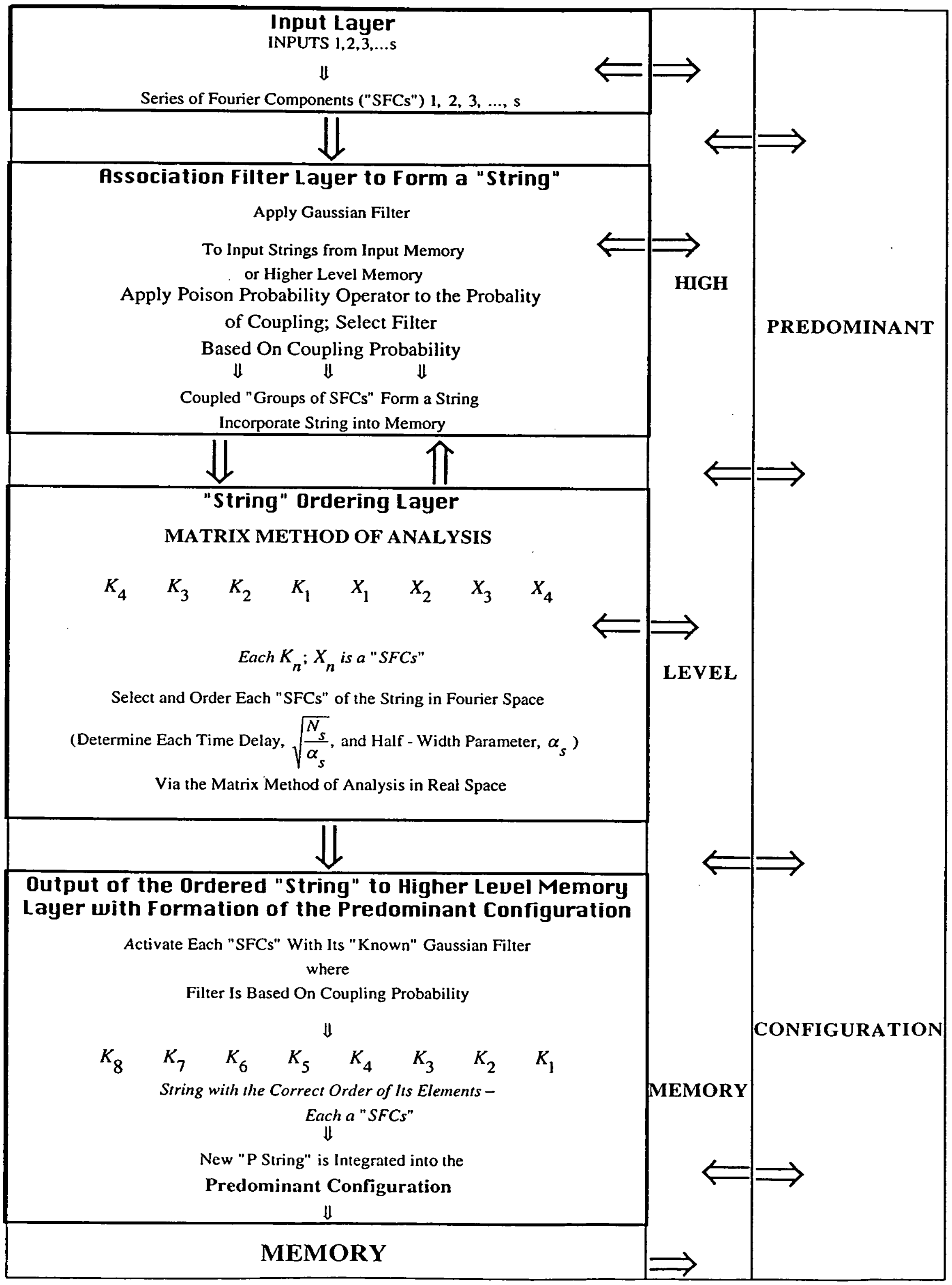

string1
Group of SFCs 1
Group of SFCs 2
Group of SFCs n
SFC1
SFC2
SFCn
FC1
FC2
FCn

Fig. 20



Input Layer
INPUTS 1,2,3,...s
Series of Fourier Components ("SFCs") 1, 2, 3, ..., s
Association Filter Layer to Form a "String"
Apply Gaussian Filter
To Input Strings from Input Memory
or Higher Level Memory
Apply Poison Probability Operator to the Probality
of Coupling; Select Filter
Based On Coupling Probability
Coupled "Groups of SFCs" Form a String
Incorporate String into Memory
"String" Ordering Layer
MATRIX METHOD OF ANALYSIS
K_4 K_3 K_2 K_1 X_1 X_2 X_3 X_4
Each K_n; X_n is a "SFCs"
Select and Order Each "SFCs" of the String in Fourier Space
(Determine Each Time Delay, $\sqrt{\frac{N_s}{\alpha_s}}$, and Half - Width Parameter, α_s)
Via the Matrix Method of Analysis in Real Space
Output of the Ordered "String" to Higher Level Memory Layer with Formation of the Predominant Configuration
Activate Each "SFCs" With Its "Known" Gaussian Filter
where
Filter Is Based On Coupling Probability
K_8 K_7 K_6 K_5 K_4 K_3 K_2 K_1
String with the Correct Order of Its Elements – Each a "SFCs"
New "P String" is Integrated into the
Predominant Configuration
MEMORY
HIGH
LEVEL
MEMORY
PREDOMINANT
CONFIGURATION

86E22T" 0260226D

FIGURE 21A

Input Layer

INPUTS 1,2,3,...s

$$V_{Out\sum_{s}\sum_{m}}(\rho,z(t))=\sum_{s}\sum_{m}\frac{\delta^2}{\delta\rho\delta z}\left[\frac{(2z^2-\rho^2)}{[\rho^2+z^2]^{5/2}}\otimes\sum_{n=1}^{\infty}a_n\delta(\rho-n\rho_0,z-nvt_0)X\left[U\left(\rho+\frac{N\rho_0}{2},z+\frac{Nvt_0}{2}\right)-U\left(\rho-\frac{N\rho_0}{2},z-\frac{Nvt_0}{2}\right)\right]\right]$$

$N_{m_{\rho_0}}$ and ρ_{0_m} Encode Amplitude and Rate of Change

$\Downarrow$

Fourier Transform and Store to Register

$$V_{\sum_{s,m}}(k_\rho,k_z)=\sum_{s=1}^{S}\sum_{m=1}^{M_s}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}\frac{4}{\rho_{0_{s,m}}z_{0_{s,m}}}a_{0_{s,m}}\sin\left(\left(k_\rho-n\frac{2\pi}{\rho_{0_{s,m}}}\right)\frac{N_{s,m_{\rho_0}}\rho_{0_{s,m}}}{2}\right)\sin\left(\left(k_z-n\frac{2\pi}{z_{0_{s,m}}}\right)\frac{N_{s,m_{z_0}}z_{0_{s,m}}}{2}\right)$$

$\Downarrow$

Recall Fourier Series

$$V_{\sum_{s,m}}(k_\rho,k_z)=\sum_{s=1}^{S}\sum_{m=1}^{M_s}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_{s,m}}N_{s,m_{\rho_0}}N_{s,m_{z_0}}e^{-jk_\rho(\rho_{\rho_{s,m}}+\rho_{1_{s,m}})}\sin\left(\left(k_\rho-n\frac{2\pi}{\rho_{0_{s,m}}}\right)\frac{N_{s,m_{\rho_0}}\rho_{0_{s,m}}}{2}\right)\sin\left(\left(k_z-n\frac{2\pi}{z_{0_{s,m}}}\right)\frac{N_{s,m_{z_0}}z_{0_{s,m}}}{2}\right)$$

$\Downarrow$

FIGURE 21B

Association Filter Layer to Form a "String"

Apply Gaussian Filters

$$H_N(f) \approx e^{-\frac{1}{2}\left(\frac{2\pi f}{\alpha}\right)^2} e^{-j\sqrt{N}\left(\frac{2\pi f}{\alpha}\right)}$$

$1,2,3,\ldots s$

To Input Strings from Input Memory
or High Level Memory

$\Leftarrow$

$1,2,3,\ldots s$

$$V_{\sum_{s,m}}(k_\rho, k_z) = \sum_{s=1}^{S}\sum_{m=1}^{M_s}\sum_{n=-\infty}^{\infty} \frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}} a_{0_{s,m}} N_{s,m_{\rho 0}} N_{s,m_{z0}} e^{-jk_\rho\left(\rho_{\rho_{0,s,m}}+\rho_{1_{s,m}}\right)}$$

$$\sin\left(\left(k_\rho - n\frac{2\pi}{\rho_{0_{s,m}}}\right)\frac{N_{s,m_{\rho 0}}\rho_{0_{s,m}}}{2}\right)\sin\left(\left(k_z - n\frac{2\pi}{z_{0_{s,m}}}\right)\frac{N_{s,m_{z0}} z_{0_{s,m}}}{2}\right)$$

Couple:

Calculate

$$P_A\left(\frac{\sqrt{N_1}}{\alpha_1}, \frac{\sqrt{N_2}}{\alpha_2}, \ldots, \frac{\sqrt{N_s}}{\alpha_s}, \delta_s\right) = \prod_s \frac{1+\exp\left[-\beta_s^{-2}\left(\frac{1-\cos 2\phi_s}{2}\right)\right]\cos(\delta_s + 2\sin\phi_s)}{2}$$

$\rightarrow$ $\leftarrow$

Based on the Coupling Cross Section,

$$\beta^2(\phi_s) = \beta_s^2 e^{i2\phi_s}$$

where β_s^2 is given by Eq.(37.111) and ϕ_s is given by Eq.(37.112)

Apply Poison Probability Operator to the Probality
of Coupling; Select Filter
Based On Coupling Probability

$\Downarrow$ $\Downarrow$ $\Downarrow$

Coupled "Groups of SFCs" Form a String
Incorporate String into Memory

Apply
Gaussian Filters to
Recalled
Fourier Series

$$H_N(f) \approx e^{-\frac{1}{2}\left(\frac{2\pi f}{\alpha}\right)^2} e^{-j\sqrt{N}\left(\frac{2\pi f}{\alpha}\right)}$$

$1,2,3,\ldots s$

$\Downarrow$

FIGURE 21C

"String" Ordering Layer

Recall String from Memory

$$V_{\sum_{s,m}}(k_\rho,k_z)=\sum_{s=1}^{S}\sum_{m=1}^{M_s}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_{s,m}}N_{s,m_{\rho_0}}N_{s,m_{z_0}}e^{-jk_\rho\left(\rho_{\rho_{s,m}}+\rho_{1_{s,m}}\right)}$$

$$\sin\left(\left(k_\rho-n\frac{2\pi}{\rho_{0_{s,m}}}\right)\frac{N_{s,m_{\rho_0}}\rho_{0_{s,m}}}{2}\right)\sin\left(\left(k_z-n\frac{2\pi}{z_{0_{s,m}}}\right)\frac{N_{s,m_{z_0}}z_{0_{s,m}}}{2}\right)$$

MATRIX METHOD OF ANALYSIS

$K_4 \quad K_3 \quad K_2 \quad K_1 \quad X_1 \quad X_2 \quad X_3 \quad X_4$

Each $K_n; X_n$ *is a "SFCs"*

$$V_{\sum_{m}}(k_\rho,k_z)=\sum_{m=1}^{M}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_m}N_{m_{\rho_0}}N_{m_{z_0}}e^{-jk_\rho\left(\rho_{\rho_m}+\rho_{1_m}\right)}\sin\left(k_\rho\frac{N_{m_{\rho_0}}\rho_{0_m}}{2}-n\frac{2\pi N_{m_{\rho_0}}}{2}\right)\sin\left(k_z\frac{N_{m_{z_0}}z_{0_m}}{2}-n\frac{2\pi N_{m_{z_0}}}{2}\right)$$

Select and Order Each "SFCs" of the String in Fourier Space

(Determine Each Time Delay, $\sqrt{\frac{N_s}{\alpha_s}}$, and Half - Width Parameter, α_s)

Via the Matrix Method of Analysis in Real Space

$\Downarrow$

FIGURE 21D

Association Filter Layer of "String" Ordering Layer

Apply Gaussian Filters to Recalled String

$$H_N(f) \approx e^{-\frac{1}{2}\left(\frac{2\pi f}{\alpha}\right)^2} e^{-j\sqrt{N}\left(\frac{2\pi f}{\alpha}\right)}$$

$1,2,3,\ldots s$

Couple:

Calculate

$$P_A\left(\frac{\sqrt{N_1}}{\alpha_1}, \frac{\sqrt{N_2}}{\alpha_2}, \ldots, \frac{\sqrt{N_s}}{\alpha_s}, \delta_s\right) = \prod_s \frac{1+\exp\left[-\beta_s^{-2}\left(\frac{1-\cos 2\phi_s}{2}\right)\right]\cos(\delta_s + 2\sin\phi_s)}{2}$$

Based on the Coupling Cross Section,

$$\beta^2(\phi_s) = \beta_s^2 e^{i2\phi_s}$$

where β_s^2 is given by Eq.(37.111) and ϕ_s is given by Eq.(37.112)

Apply Poison Probability Operator to the Probality of Coupling; Select Filter Based On Coupling Probability

Apply Gaussian Filters

$$H_N(f) \approx e^{-\frac{1}{2}\left(\frac{2\pi f}{\alpha}\right)^2} e^{-j\sqrt{N}\left(\frac{2\pi f}{\alpha}\right)}$$

$1,2,3,\ldots s$

To High Level Memory Strings

$1,2,3,\ldots s$

$$V_{\sum_{s,m}}(k_\rho, k_z) = \sum_{s=1}^{S}\sum_{m=1}^{M_s}\sum_{n=-\infty}^{\infty} \frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}} a_{0_{s,m}} N_{s,m_{\rho 0}} N_{s,m_{z0}} e^{-jk_\rho(\rho_{\rho_{s,m}} + \rho_{1_{s,m}})}$$

$$\sin\left(\left(k_\rho - n\frac{2\pi}{\rho_{0_{s,m}}}\right)\frac{N_{s,m_{\rho 0}}\rho_{0_{s,m}}}{2}\right)\sin\left(\left(k_z - n\frac{2\pi}{z_{0_{s,m}}}\right)\frac{N_{s,m_{z0}} z_{0_{s,m}}}{2}\right)$$

FIGURE 21E

Output of the Ordered "String" to Higher Level Memory Layer with Formation of the Predominant Configuration

Activate Each "SFCs" With Its "Known" Gaussian Filter

where

Filter Is Based On Coupling Probability

$$V_{\sum_{s,m}}(k_\rho,k_z)=\sum_{s=1}^{S}\sum_{m=1}^{M_s}\sum_{n=-\infty}^{\infty}\frac{4\pi}{1+\frac{k_z^2}{k_\rho^2}}a_{0_{s,m}}N_{s,m_{\rho0}}N_{s,m_{z0}}e^{-\frac{1}{2}\left(v_{s\rho0}\frac{k_\rho}{\alpha_{s\rho0}}\right)^2}e^{-j\sqrt{\frac{N_{s\rho0}}{\alpha_{s\rho0}}}(v_{s\rho0}k_\rho)}e^{-\frac{1}{2}\left(v_{sz0}\frac{k_z}{\alpha_{sz0}}\right)^2}e^{-j\sqrt{\frac{N_{sz0}}{\alpha_{sz0}}}(v_{sz0}k_z)}$$

$$e^{-jk_\rho(\rho_{\rho_{s,m}}+\rho_{1_{s,m}})}\sin\left(\left(k_\rho-n\frac{2\pi}{\rho_{0_{s,m}}}\right)\frac{N_{s,m_{\rho0}}\rho_{0_{s,m}}}{2}\right)\sin\left(\left(k_z-n\frac{2\pi}{v_{s,m}t_{0_{s,m}}}\right)\frac{N_{s,m_{z0}}z_{0_{s,m}}}{2}\right)$$

$\Downarrow$

$K_8 \quad K_7 \quad K_6 \quad K_5 \quad K_4 \quad K_3 \quad K_2 \quad K_1$

String with the Correct Order of Its Elements—
Each a "SFCs"

$\Downarrow$

New "P String" is Integrated into the

Predominant Configuration